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Tech Notes

Ethernet 100BaseTX and 10BaseT Cables: Guidelines and Specifications

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Contents

Introduction

This document provides guidelines and specifications for Ethernet 100BaseTX and 10BaseT cables.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on the software and hardware versions:

- Ethernet 100BaseTX and 10BaseT cables

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Which Cable Do I Need?

The table below helps you determine which type of cable you need for your setup.

	Hub	**Switch**	**Router**	**Workstation**
Hub	Crossover	Crossover	Straight	Straight
Switch	Crossover	Crossover	Straight	Straight
Router	Straight	Straight	Crossover	Crossover
Workstation	Straight	Straight	Crossover	Crossover

Ethernet Cabling Guidelines

The table below lists the Ethernet cabling guidelines for 10BaseT and 100BaseTX cables.

Specifications	10BaseT	100BaseTX
Maximum number of segments per network	5	- With Class I repeaters: 1 - With Class II repeaters: 2
Maximum hop count[1]	4	- With Class I repeaters: none - With Class II repeaters: 1
Maximum number of nodes per segment	1024	1024
Cable type required	UTP, category 3, 4, or 5	UTP category 5 or Shielded twisted pair (STP)

[1]Hop count = Routing metric used to measure the distance between a source and a destination.

Ethernet Version 2 and IEEE 802.3 Physical Characteristics

The table below lists the Ethernet version 2 and IEEE 802.3 physical characteristics of the different Ethernet cables.

	Ethernet	IEEE 802.3		
		10Base5	10Base2	10BaseT
Data rate (Mbps)	10	10	10	10
Signaling method	Baseband	Baseband	Baseband	Baseband
Maximum segment length (m)	500	500	185	100 (Unshielded twisted pair - UTP)
Media	50-ohm coax (thick)	50-ohm coax (thick)	50-ohm coax (thin)	Unshielded twisted pair (UTP)
Topology	Bus	Bus	Bus	Star

Fast Ethernet Connector Pinouts RJ-45

100BaseTX RJ-45 Connector

The Fast Ethernet RJ-45 port actively terminates wire pair 4 and 5 and wire pair 7 and 8. Common-mode termination reduces electromagnetic interference (EMI) and susceptibility to common-mode sources.

The table below shows the pin and corresponding signal for the RJ-45 connector pinouts.

RJ-45 Connector Pinout	
Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Specifications and Connection Limits for 100-Mbps Transmission

The table below lists cable specifications and connection limits for 100-Mbps transmission.

Parameter	RJ-45	MII	SC-type
		Category 3, r,	

Cable specification	Category 5[2], UTP[3], 22 to 24 AWG[4]	or 5, 150-ohm UTP or STP, or multimode optical fiber	62.5/125 multimode optical fiber
Maximum cable length	-	0.5 m (1.64 ft.) (MII-to-MII cable[5])	-
Maximum segment length	100m (328 ft.) for 100BaseTX	1 m (3.28 ft.)6 or 400 m (1312 ft.) for 100BaseFX	100 m (328 ft.)
Maximum network length	200 m (656 ft.)[6] (with one repeater)	-	200 m (656 ft.)[6] (with one repeater)

[2] EIA/TIA-568 or EIA-TIA-568 TSB-36 compliant.

[3] Cisco Systems does not supply Category 5 UTP RJ-45 or 150-ohm STP MII cables. Both are available commercially.

[4] AWG = American Wire Gauge. This gauge is specified by the EIA/TIA-568 standard.

[5] This is the cable between the MII port on the port adapter and the appropriate transceiver.

[6] This length is specifically between any two stations on a repeated segment.

IEEE 802.3u Physical Characteristics

The table below lists the IEEE 802.3u physical characteristics for the Ethernet 100BaseT cable.

Parameter	100BaseT
Data rate (Mbps)	100
Signaling method	Baseband
Maximum segment length (in meters)	100 m between DTE[7] and repeaters
Media	RJ-45: Category 5 UTP MII: Category 3, 4, or 5, 150-ohm UTP or STP, with appropriate transceiver
Topology	Star/Hub

[7] DTE = data terminal equipment.

Ethernet 10BaseT: RJ-45

This section discusses the cable specifications for the 10-Mbps 10BaseT cable, and describes the different 10BaseT port pinouts.

Cable Specifications for 10-Mbps 10BaseT

The table below lists for cable specifications for the 10-Mbps 10BaseT cable.

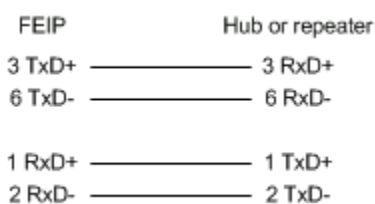| Parameter	RJ-45
Cable specificataion	Category 3 or Category 5 UTP with 22 to 24 AWG
Maximum segment length	100 m (328 ft.) for 10BaseT
Maximum network length	2,800 m (9,186 ft.) (with four repeaters)

10BaseT Port Pinouts

The table below lists the 10BaseT port pinouts.

8 pin[8]	Description
1	TX+
2	TX-
3	RX+
6	RX-

[8]Pins 4, 5, 7, and 8 are not used.

Straight-Through 10BaseT Cable (RJ-45 to RJ-45)

The table below lists the port pinouts for the straight-through 10BaseT cable.

RJ-45 Pin	Signal	Direction	RJ-45 Pin
1	TX+	--->	1
2	TX-	--->	2
3	RX+	<---	3
4	-	-	4

5	-	-	5
6	RX-	<---	6
7	-	-	7
8	-	-	8

Examine the sequence of colored wires to determine the type of RJ-45 cable, as follows:

- Straight-through - the colored wires are in the same sequence at both ends of the cable.

- Crossover - the first (far left) colored wire at one end of the cable is the third colored wire at the other end of the cable.

- Rolled - the colored wires at one end of the cable are in the reverse sequence of the colored wires at the other end of the cable.

RJ-45 Straight-Through (Ethernet) Cable Pinouts

The table below lists the cable pinouts for the Ethernet RJ-45 straight-through cable.

Signal	Pin	Pin	Signal
TX+	1	1	TX+
TX-	2	2	TX-
RX+	3	3	RX+
-	4	4	-
-	5	5	-
RX-	6	6	RX-
-	7	7	-
-	8	8	-

RJ-45 Crossover (Ethernet) Cable Pinouts
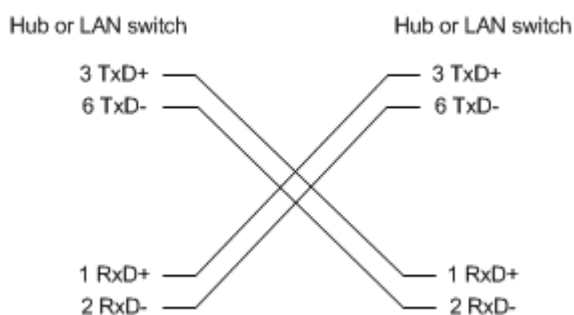
The table below lists the pinouts for the Ethernet RJ-45 crossover cable.

Signal	Pin	Pin	Signal

TX+	1	3	RX+
TX-	2	6	RX-
RX+	3	1	TX+
-	4	4	-
-	5	5	-
RX-	6	2	TX-
-	7	7	-
-	8	8	-

RJ-45 Rolled (Console) Cable Pinouts

The table below shows the pinouts for the RJ-45 rolled console cable.

Signal	Pin	Pin	Signal
RTS	1	8	CTS
DTR	2	7	DSR
TxD	3	6	RxD
GND	4	5	GND
GND	5	4	GND
RxD	6	3	TxD
DSR	7	2	DTR
CTS	8	1	RTS

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